Title: Locality-based placement of virtual network functions in mobile networks

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Context and Problem Statement:
Originally implemented as hardware middle-boxes to be installed in network infrastructures, network functions (EPC, router, DPI, firewall, cache etc.) are evolving towards the Network Functions Virtualization (NFV) paradigm: they are being virtualized and delivered as software bundles that can be deployed and used on demand and on commodity hardware platforms. This approach is strongly supported by Internet Services Providers (ISPs) at ETSI [1] to build the so-called NFV infrastructures, which basically consist in cloud platforms that can host virtual network functions. These infrastructures are intended to be deployed at PoPs (Points-of-Presence) or local aggregation points in carrier networks.

In parallel, the big data and big analytics trends have conducted the telcos to collect and analyze massive sets of data in order to better understand users' behavior and improve their services [2]. Last year, an ACN scientific research project has shown that, in a city such as Milan, most of the mobile communications are local and follow a Power law [3].

In this scientific research project, we aim at studying how NFV can be used, benefiting from such locality, to better place mobile services (e.g. virtual EPC/IMS) in PoPs close to the users instead of a central architecture, thus reducing both access latency and core network traffic. To address such a question, we will use the mobile dataset and the model we proposed and we will study, adapt and implement one of the heuristics for the capacitated facility location problem it represents. The evaluation will compare such an approach with the traditional centralized architecture.

Skills:
Most of the implementation will be done using Python.

Short bio:
Mathieu Bouet received his PhD degree from the Computer Science laboratory (LIP6) of Pierre & Marie Curie University (UPMC), France, in 2009. Since 2009, he has been working as a research engineer at Thales Communications & Security, where he first conducted research on autonomic networks and cyber-security and then initiated and developed activities on software-defined networking and network functions virtualization. In 2014, he became the technical manager of the Network Softwarization research group. He coordinates several collaborative research projects on this topic. His current research interests are the softwarization of IP and mobile networks (routing and traffic engineering, mobility, new architectures and performance).

References:
[1] M. Chiosi et al., "Network Functions Virtualization - An Introduction, Benefits, Enablers, Challenges and Call for Action", ETSI white paper, Oct. 2012.

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